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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/325,951	06/04/1999	MIN-HSIUNG CHIANG	TSMC98-262	3488

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EXAMINER

POMPEY, RON EVERETT

ART UNIT PAPER NUMBER

2812

DATE MAILED: 11/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/325,951

Applicant(s)

CHIANG ET AL.

Examiner

Ron E Pompey

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6 and 8-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-6 and 8-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a "first high temperature oxidation step above 1100 degrees centigrade..., which serves to prevent the out-diffusion of nitrogen species from the patterned silicon nitride layer 34. Thereafter the continued thermal oxidation ... at a lower temperature to assure no further likelihood of silicon nitride inclusion formation." (Page 9 of specification), does not reasonably provide enablement for "a first oxidation temperature of at least above 1100 degrees centigrade ... to prevent out-diffusion of nitrogen species and minimize formation of silicon oxynitride inclusions within the silicon oxide layers" (claim 1 and 6). The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. **The specification says to minimize the formation of silicon oxynitride inclusions within the silicon oxide layers a lower temperature (meaning lower than 1100°C) oxidation is needed.** But the claim language is written as a temperature higher than 1100°C are needed to prevent the out-diffusion of nitrogen species **and** minimize the silicon oxynitride inclusions.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Liu et al. (US 5,739,063).

Liu discloses the steps of:

For claims 1 and 4:

oxidizing the silicon semiconductor substrate locally at a first oxidation temperature of at least above 1100 degrees centigrade through the silicon nitride mask pattern to form silicon oxide dielectric layers (col. 6, lns. 27-34).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 5-6 and 8-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Higashitani et al. (US 5,637,528).

Higashitani discloses the steps of:

For claims 6 and 8:

oxidizing the silicon substrate locally at a first temperature of at least above 1100 degrees centigrade through the patterned silicon nitride mask layer to form silicon oxide dielectric field oxide (FOX) isolation layers (col. 5, Ins. 5-10).

oxidizing the silicon substrate further at a second temperature no greater than 1100 degrees centigrade (col. 1, ln. 60 – col.2, ln. 6).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made that the range of temperatures disclosed by Higashitani, for each oxidizing step, encompasses the ranges of temperature claimed by the applicant. In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In *re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

The examiner takes official notice that the limitations of claims 3, 5 and 9-10, substrate materials, dry environment conditions and crystal orientations, are conventional in semiconductor processing of today.


5. The applicant argues that neither the Liu nor Higashitani prior art references fail disclose oxidizing through a silicon nitride mask. However, in both references, Liu (column 6, lines 55-59) and Higashitani (Figure 1C), a nitride mask is formed prior to the oxidizing steps and not removed until post oxidizing and formation of the field oxide. Therefore, as stated in the above rejection oxidizing is performed through a nitride mask.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ron E Pompey whose telephone number is (703) 305-3016. The examiner can normally be reached on flex schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Ron Pompey
Art Unit: 2812
November 4, 2002


John F. Niebling
Supervisory Patent Examiner
Technology Center 2800